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hands. They certainly owe to the author and American pathologists a speedy revision.

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A New Era in Chemistry. By HARRY C. JONES. New York, D. Van Nostrand and Company. 1913. Price \$2.00.

It is expected of a book written by a teacher and investigator so eminent as Professor Jones that it will be written in a clear, enthusiastic and readable style, and especially that it will be scientifically accurate and sound. That the book meets some of these expectations no one can doubt who reads Professor Howe's very laudatory review in the December number of the *American Chemical Journal*. The present reviewer, however, while recognizing merit in the book, certainly believes that no author should be permitted to go uncriticized who is so careless of his statements as is the author of "A New Era in Chemistry."

Among many other passages in the book which are open to criticism the following have been selected as representative.

In discussing the formula for benzene on page 12 the author says: "The study of the substitution products led to the conclusion that three carbon atoms in benzene are different from the other three. . . ." Whatever may be the final outcome of recent work in this field, it is certainly well known that the study of benzene and its substitution products led neither Kekulé nor any of his contemporaries to any such conclusion.

On pages 51-52 is given an inadequate, even quite erroneous, account of the stereochemistry of tartaric acid. The author writes, "Tartaric acid is especially interesting, having the constitution. . . . We see that it contains not only one asymmetric carbon atom, but two. These would have the opposite effects upon a beam of polarized light; the one half of the molecule turning it in one direction, and the other half turning it by an exactly equal amount in the opposite direction. The result would be that the substance would be racemic or optically inactive."

Certainly no one can get any clear conception of the stereochemistry of tartaric acid from such a description.

Speaking, on page 63, of the one degree of freedom in the two-phase-one-component system, water and water vapor, the statement is made that "we can vary either the temperature or pressure, but varying the one we fix the other." And on the next page, in discussing the triple point, the author writes: "We can not move the point T in any direction without destroying the equilibrium. . . ."

These are very careless statements, both telling what does not take place. What the author intends to say with respect to the former is that a change either of the temperature or the pressure brings about a concomitant change in the other. With respect to the latter it may be noted that T , the triple point, is a fixed point and therefore can not be moved. A change of temperature or pressure brings about the disappearance of one of the three phases, but does not move the point T .

On page 281 we read, "It [radium] is everywhere, also, in atmospheric air"; and on page 273 it is stated that the alpha particle "carries one positive charge of electricity." Radium apparently does occur nearly everywhere, but its presence in the atmosphere is yet to be demonstrated. The alpha particle carries two charges, not one.

The following, taken from pages 273, 277 and 287, are given as examples of careless statements. No objections are raised concerning what the author probably intended to say: "Radium is naturally radioactive as it is called." "A radioactive substance is one that gives off radiations. . . ." "The best method used was the ice calorimeter." "A gram of radium therefore liberates about eighty calories of heat every hour, during its whole life history." "The largest amount of radium emanation thus far obtained is only a fraction of a cubic millimeter; and, yet, this gives off three fourths of all the heat liberated by radium." A gram of radium liberates heat at the rate of "about" eighty calories per hour so long only as it remains sensibly a

gram. The expression "during its whole life history" has no meaning whatever in this connection. Concerning the last of the above statements it may be said that undoubtedly the equilibrium quantity of radium is meant, but it is not so stated.

On page 287 it is said that "the radium emanation induces radioactivity on all objects on which it is deposited." It is the disintegration products of the emanation which are deposited, and not the emanation itself. The next sentence, which reads, "This induced radioactivity decays or disappears, as the emanation which causes it decays," while perhaps not entirely wrong, certainly does not state the facts clearly.

In discussing the disintegration of radioactive substances the author uses the expression "life history" sometimes to mean the "half period" of Rutherford, as, for instance, on page 283, when he speaks of thorium emanation as having a much shorter "life history" than radium emanation; at other times, as on page 288, it is apparently synonymous with "mean life," for he here speaks of 2,000 to 3,000 years instead of 1,760 years; while in another place, pages 294-295, he uses the expression with obviously still another meaning, for he here says that "the life history of radium is between two and three thousand years. This means that none of the radium now present existed more than twenty-five hundred years ago." There may be a legitimate sense in which one may speak of the "life history" of a radioactive substance, but certainly the expression should not be used in place of "mean life" or "half period." It may be remarked that, quite contrary to the above statement of the author, a very considerable proportion of the radium now present in the earth's crust was in existence twenty-five hundred years ago.

In the judgment of the reviewer the author also indulges far too freely in sweeping, unqualified statements. As an example of such a statement the following is quoted from the chapter on the "Origin of Stereochemistry," page 58. "Kekulé had converted empiricism in the study of carbon into system. Van't

Hoff had made possible the beginning of a science of organic chemistry." Most organic chemists will probably say of this, that while there is possibly a difference in degree, there is hardly a difference in kind between the achievement of Van't Hoff and that of Kekulé.

Another example is taken from page 137. "It (water) owes its existence to the fact that hydrogen and hydroxyl ions can not remain in the presence of one another uncombined." This, of course, in a sense, is true. But then the following equally impressive statement is also true. Hydrogen chloride owes its existence to the fact that, depending upon conditions, chlorine and hydrogen ions can or can not remain in the presence of each other uncombined, which is equivalent to saying that hydrogen chloride owes its existence to the fact that it is hydrogen chloride. Moreover, hydrogen and hydroxyl ions can and do exist together uncombined, and it is to this fact that the many important phenomena of hydrolysis are due.

It is always of doubtful expediency to criticize an author's English; nevertheless, the reviewer ventures to quote the following from pages 117 and 268:

"Take, for example, water. We would find most of the hydrogens united with oxygen to form molecules of water; but, in addition, we would have some free hydrogens and some free oxygens."

"Take a salt like potassium chloride. When it is thrown into water an electron passes from the potassium over to the chlorine. The chlorine having received an additional electron thus becomes charged negatively, while the potassium having lost an electron becomes charged positively. . . . Take, again, a salt like potassium sulphate. Each potassium loses one electron to the SO_4 , which thus acquires two negative charges, the potassium having each one positive charge." If this sort of description is justified by its directness and dramatic effect, then perhaps the only criticism to be offered is that "potassium" (four lines above) should read "potassiums."

One is disappointed after reading of the

dramatic manner in which Kenjira Ota arrived upon the scene of his labors, pages 148-150, to find him accomplishing nothing more remarkable than the measurement of the freezing points of certain solutions.

In view of the fact that none of the author's own investigations have been in the field of radioactivity, it seems rather remarkable that the references, pages 260, 261 and 296, to the author's book on the "Electrical Nature of Matter and Radioactivity" are not supplemented by the titles of well-known standard works on the subject.

However, the reviewer does not wish to be understood as wholly condemning the book. Far from it. The idea of writing a book on a "New Era in Chemistry" is an excellent one, and the story, for the most part, is most interestingly told, but at the same time it is the reviewer's conviction that no one who permits so many inaccurate, careless and exaggerated statements to creep into his work should go unrebuked.

The book closes with an appendix in which are given some delightful personal reminiscences of the great men who made possible the "New Era in Chemistry."

EDWARD C. FRANKLIN

Rays of Positive Electricity and their Application to Chemical Analysis. By SIR J. J. THOMSON. Longmans, Green & Co. 1913. Pp. vi + 132. Price, \$1.40.

The day of the monograph in physics is apparently here, and it will be hailed with delight not only by physicists, but also by workers in all of the neighboring sciences. For in a period like the present in which new material is appearing very rapidly, and in which the "accumulation time" of new viewpoints is extraordinarily short, it is of the utmost importance that the results of recent research be got as quickly as possible in some form which is intermediate between the journal article, with its inaccessibility and incompleteness, and the general treatise with its rigidity and inertia. Monographs of the sort which Longmans has announced, dealing with half a dozen

of the more recently developed departments of physics and written by men who have been prominently identified with their development, will appeal to a wide audience.

And if the whole Longmans series is as good as the first number, the publishers, the authors, the editors and the public may all congratulate themselves. For Sir J. J. Thomson has done his very best work, so it seems to the reviewer, on positive rays, and the present monograph is a fascinatingly simple and straightforward account of that work, introduced by a discussion of the preceding work of Goldstein and of Wien, and supplemented by a chapter on the Döppler effect with positive rays, discovered and investigated chiefly by Stark and his pupils. If any one has had doubt about the effectiveness of the positive-ray method as a means of discovering the sorts of atoms and molecules which constitute the residual gases in discharge tubes, and the values of the electrical charges carried by these atoms and molecules, he should take enough time to study carefully the five plates of actual photographs contained in this book. The parabolas shown in these photographs are about as convincing evidence as could be desired.

R. A. MILLIKAN

SPECIAL ARTICLES

DESICCATION OF CERTAIN GREGARINE CYSTS

IN connection with other studies on the cephaline gregarine *Stylocephalus giganteus* Ellis some data have been collected during the past fall concerning the viability of the cysts of this sporozoon and the effect of dryness on the formation of sporocysts. This gregarine is a common parasite in the alimentary canal of the Tenebrionid beetles of the genera *Eleodes* and *Asida*, so abundant in the semi-arid plains of eastern Colorado.

The cysts of *Stylocephalus giganteus* are subspherical, about 450 microns in diameter and opaque white when first discharged from the host. Unlike the cysts of many species of gregarines, they are not provided with thick, gelatinous envelopes, their walls on the contrary, are quite thin, the gelatinous envelope